

Introduction



**Susan J. Seestrom,
Physic Division Leader**

As the new director of Physics Division, selected in November of 2000, I am honored to lead this outstanding organization and the creative and excellent staff whose work is represented in this Progress Report. From our senior staff to our newest students and postdocs, from scientists to technicians to administrators, everyone's contributions were necessary to achieve the significant research and development progress we have made in the past two years. We search for the very best people in every kind of position, and it is these people that make me proud to serve as Division Leader.

I have done a lot of thinking in the past few months, and I would like to share my thoughts about the vision and mission of the Labora-

tory and Physics Division, and why a Physics Division is needed for the Laboratory to be successful in executing its mission.

The Laboratory's national-security mission demands significant operational and overhead costs, such as classification and security—making basic research at Los Alamos expensive, especially when compared to a single-purpose lab or a university. Nonetheless, we continue to pursue basic research because of the dynamic synergy that can develop between it and the applied research mission, in which both activities are able to benefit and flourish. Our 55-year history exhibits innumerable examples of this synergy from the Nobel prize-winning research of Fred Reines and Clyde Cowan in discovering the neutrino, to current day proton-radiography and quantum-information-science programs.

Basic research is most valued as the engine for new ideas and technologies that feed back to benefit the core mission of the Laboratory. First-rate basic research activities also serve as a magnet for the best scientific talent, who then may contribute to our national-security mission. A possibly under-appreciated benefit is that basic research nurtures a culture of disciplined scientific inquiry and peer review, essential to any future one can envision for the Lab.

On the other hand, basic research benefits significantly from the diverse array of resources available at a multi-disciplinary lab, from facilities, equipment, and computational power to intellectual expertise that spans all scientific disciplines. We can accomplish research goals easily at Los Alamos that would be difficult to impossible elsewhere. Researchers also have ample opportunity to apply their expertise and skills to problems of broad national interest.

The creation of the Los Alamos Meson Physics Facility (LAMPF) provides a case study of the synergy that can develop between basic and applied research. LAMPF, a high-power 800-MeV proton accelerator, was the flagship of nuclear science in this country for nearly 20 years. Scientists in Physics Division conceived of and created LAMPF. Many of the scientists and engineers who were attracted to Los Alamos by the unique capabilities of LAMPF are now engaged in mission-focused programs in Physics (P); Chemistry (C); Theoretical (T); Dynamic Experimentation (DX); Applied Physics (X); Environment, Safety, and Health (ESH); and other divisions at the Laboratory. The LAMPF facility enabled other scientists to invent and build the proton storage ring and the Weapons Neutron Research facility. From those

facilities, programs such as the accelerator transmutation of waste, accelerator production of tritium, and proton radiography were spawned, and more scientists were attracted to the Laboratory.

In order that the Laboratory continue to derive that dynamic synergy, we must foster the necessary conditions and culture. At this writing, our Division staff is just beginning a planning effort that will address not only the science we should pursue in the future, but also the culture and working environment we wish to create for our Division.

If we continue to successfully nurture the atmosphere of creativity and synergy at Los Alamos, we will remain a premier resource to

the country's national-security mission for the next 50 years.

I hope you enjoy the research highlights we've selected for this Progress Report and that you will share my enthusiasm and excitement for the outstanding science we continue to pursue.

Susan J. Seestrom

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Physics Division Leader*

Mission and Goals

The mission of Physics Division is to further our understanding of the physical world, to generate new and improved technology in experimental physics, and to establish a physics foundation for current and future Los Alamos programs.

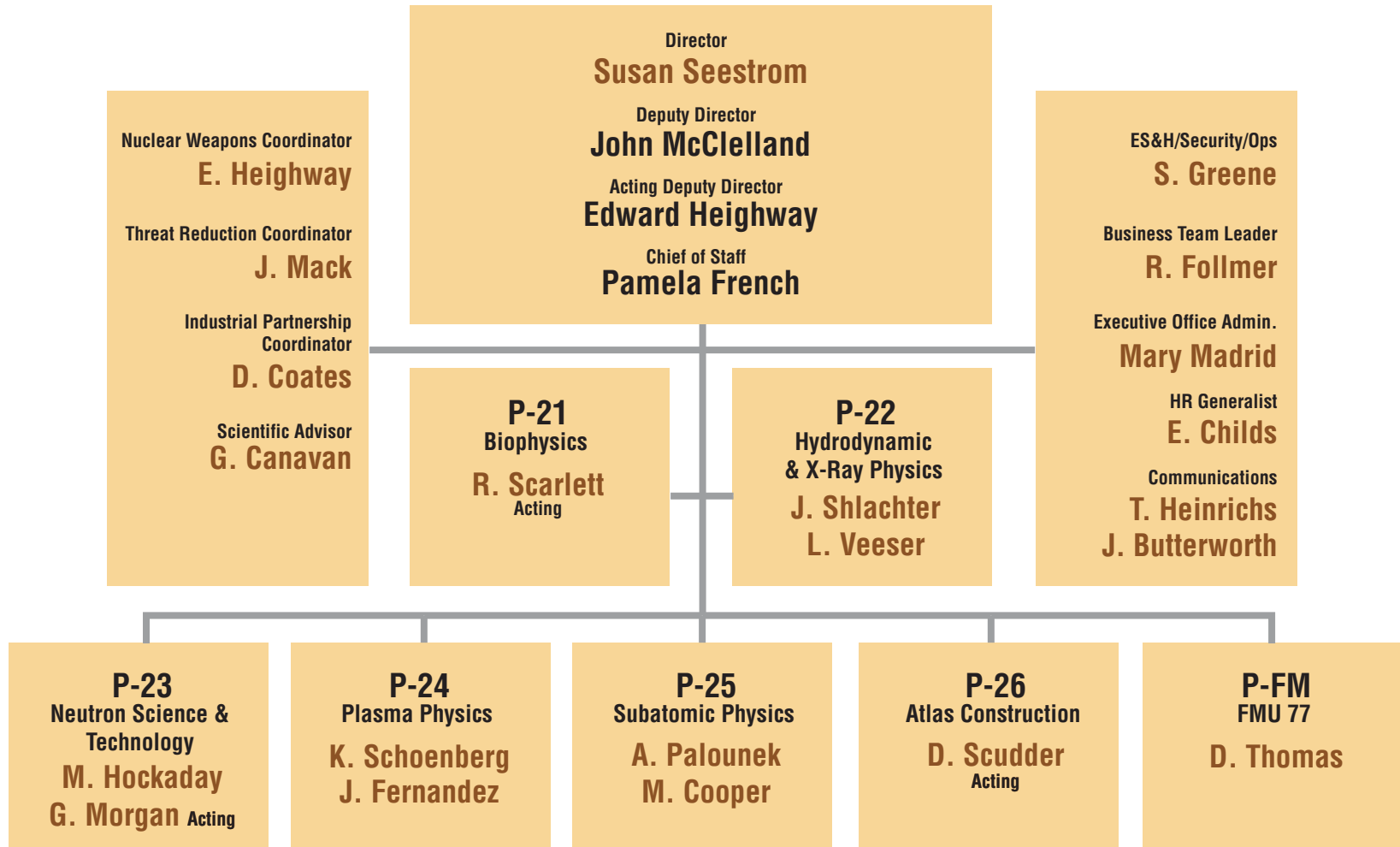
The goals of Physics Division are to

- provide the fundamental physics understanding supporting Laboratory programs;
- investigate the basic properties of nuclear interactions, high-energy-density and hydrodynamic systems, and biological systems with a view toward identifying technologies applicable to new Laboratory directions;
- identify and pursue new areas of physics research, especially those to which the unique capabilities of the Laboratory may be applied;
- explore interdisciplinary areas of scientific endeavor to which physical principles and the methods of experimental physics can make an important contribution; and
- maintain strength in those disciplines that support the Laboratory mission.

Physics Division pursues its goals by

- establishing and maintaining a scientific environment that promotes creativity, innovation, and technical excellence;
- undertaking research at the forefront of physics with emphasis on long-term goals, high risks, and multidisciplinary approaches;
- fostering dialogue within the Division and the scientific community to realize the synergistic benefits of our diverse research interests;
- encouraging the professional development of each member within the Division; and
- conducting all of its activities in a manner that maintains a safe and healthful workplace and protects the public and the natural environment.

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Physics Division Data

		FY99	FY00
P-21: Biophysics	Operating Costs ^a	5.9	6.1
	Staff Members ^b	16	19
	Graded Employees ^c	18.1	8
P-22: Hydrodynamic and X-Ray Physics	Operating Costs	11.7	9.2
	Staff Members	29	25
	Graded Employees	29	22
P-23: Neutron Science and Technology	Operating Costs	14.0	14.2
	Staff Members	39	37
	Graded Employees	19	20
P-24: Plasma Physics	Operating Costs	14.6	15.0
	Staff Members	37	39
	Graded Employees	35	32
P-25: Subatomic Physics	Operating Costs	11.1	11.0
	Staff Members	34	2
	Graded Employees	20	18
P-26: Atlas Construction	Operating Costs	9.3	12.6
	Staff Members	4	6
	Graded Employees	1	9
P-DO: Physics Division Office	Operating Costs ^d	0.5	1.5
	Staff Members ^d	8	9
	Graded Employees ^e		7
Total Operating Costs		67.1	69.6
Capital Equipment Costs		1.7	3.2
Total Costs		68.8	72.8
Total Income		68.4	72.8
Total Underrun/(Overrun)		(0.4)	0

^aCosts, Income, and underrun/(overrun) are reported in \$M.

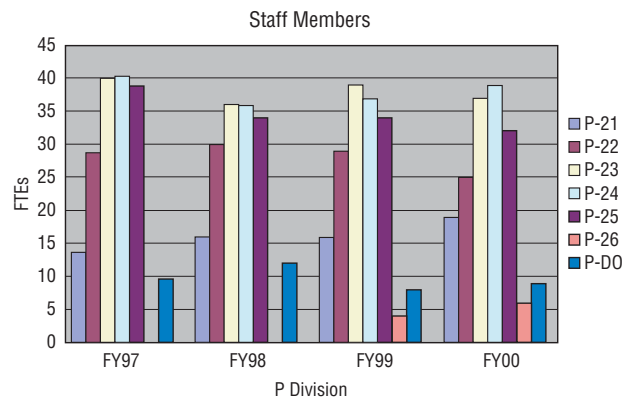
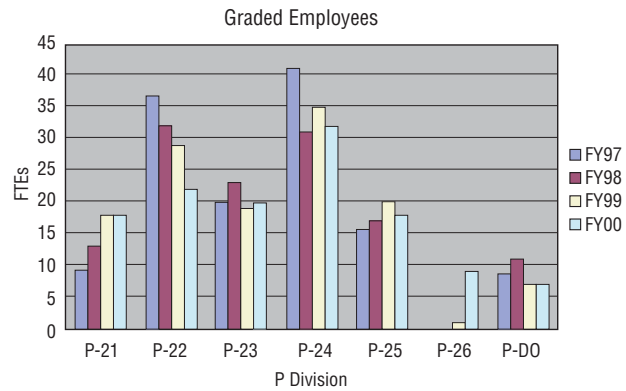
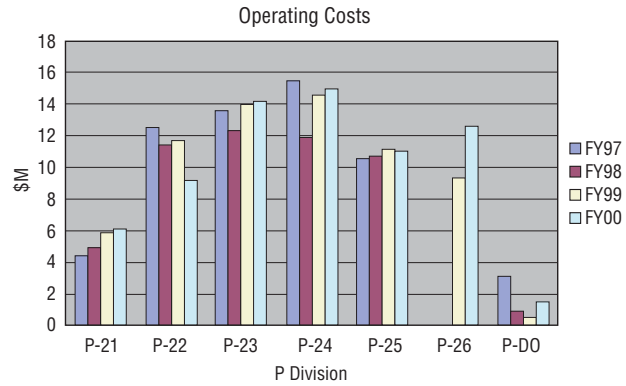
^bStaff Members are reported in full-time employees (FTEs) and include technical staff members (TSMs), TSM contractors, postdoctoral employees, and management.

^cGraded Employees are reported as FTEs and include office support, technicians, graduate research assistants (GRAs), undergraduate students (UGSs), and contractors.

^dThis value is the direct costs.

^eThis value included direct and indirect FTEs.

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FY00 Operating Costs = \$69.6M

